REMARKS

Applicants acknowledge receipt of the Examiner's final office action dated June 9, 2004. This office action rejects some claims and indicates that other claims are allowable if rewritten in independent form. More specifically, the office action rejects claims 26-32 through 35 U.S.C. § 112, first paragraph, as based on a disclosure which is not enabling. Claims 1, 12, 13, 19-24, 33, and 34 stand rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent Number 6,009,120 issued to Nobakht ("Nobakht") in view of U.S. Patent Number 6,477,200 issued to Agazzi et al. ("Agazzi"). Claims 2-6 stand rejected under 35 U.S.C. § 103 as being unpatentable over Nobakht in view of Agazzi and further in view of U.S. Patent Number 5,675,394 issued to Choi ("Choi"). Claims 14-16, 22, and 35-37 stand rejected under 35 U.S.C. § 103 as being unpatentable over Nobakht in view of Agazzi and further in view of Loginov et al., ESSIS, implementing the high speed modem with multi-dimensional modulation using the TMS320C542DSP, ESISS, Paris 1996, SPRA321 ("Loginov"). Claim 17, 18, 38, and 39 stand rejected under 35 U.S.C. § 103 as being unpatentable over Nobakht in view of Agazzi and further in view of U.S. Patent Number 5,181,198 issued to Lechleider ("Lechleider"). However, claims 25 and 7-11 were indicated as allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. In light of the foregoing amendments and following remarks, Applicants respectfully request the Examiner's reconsideration and reexamination.

The office action objected to grammatical and punctuality errors contained within claims 12, 19, and 33. Claims 12, 19, and 33 have been amended in response to the

Examiner's objections. Applicants respectfully request entry of the amendments to claims 12, 19, and 33.

Claims 26-32 stand rejected under 35 U.S.C. § 112, first paragraph. The office action alleges that these claims are based on a disclosure which is not enabling. Applicants have elected to cancel claims 26-32 without prejudice and reserve the right to prosecute claims 26-32 in a continuation application.

Most pending claims stand rejected under 35 U.S.C. § 103 as being obvious in view of combined references. To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves, or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference, or references when combined, must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on Applicants' disclosure. The initial burden is on the Examiner to provide some suggestion of the desirability of doing what the inventor has done. To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the reference. MPEP § 706.02(j). Applicants submit that the office action has failed to provide a prima facie basis for rejecting pending claims under 35 U.S.C. § 103.

Claims 1, 12, 13, 19-24, 33, and 34 stand rejected under 35 U.S.C. § 103 as being unpatentable over Nobakht in view of Agazzi. Claim 1 sets forth:

> 1. An apparatus for use-in a communication network, the apparatus comprising:
> an input node configured to receive an input signal vector; and
> a multi-dimensional equalizer coupled to the input node, <u>wherein the multi-dimensional equalizer is configured to cancel far end cross talk</u> and intersymbol interference, wherein the multi-dimensional equalizer is configured to process the input signal vector to provide an output signal vector. (Emphasis Added)

With respect to the rejection of independent claim 1, the Office Action admits that Nobakht fails to teach claim 1's limitation of a multi-dimensional equalizer that cancels far end cross talk. Thereafter, the office action alleges that this missing claim limitation can be found in Agazzi, citing column 12, lines 47-64 in support thereof. In rejecting claim 1, the office action alleges that it would be obvious for the multi-dimensional equalizer of Nobakht to have the ability to cancel far end cross talk. The office action also alleges that motivation to combine Nobakht and Agazzi would be that cross talk could cause bit errors and therefore reduce system performance.

The office action does not indicate that Nobakht and Agazzi expressly or impliedly suggest the invention set forth in claim 1. Presumably, the office action asserts the motivation to combine Nobakht with Agazzi is in the knowledge generally available to one of ordinary skill in the art. MPEP § 706.02(j) makes clear that if that Nobakht and Agazzi do not expressly or impliedly suggest the invention of claim 1, the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of Nobakht and Agazzi. The only reasoning provided in the office action for combining Nobakht and Agazzi is

that cross talk can cause bit errors and therefore reduce system performance. Presumably, the office action asserts that cross talk exists and causes bit errors in the multi-dimensional equalizer of Nobakht. Presuming this to be true, it appears the office action asserts that one of skill would seek to improve performance of the multi-dimensional equalizer in Nobakht by reducing far end cross talk by using the far end cross talk noise canceller of Agazzi. If applicants presumptions about the office action rejection are true, applicants submit there are two many presumptions for the rejection of claim 1 to be convincing.

Regardless of the presumptions, the office action appears to argue that any feature added to Nobakht to enhance system performance is obvious. Applicants submit that such reasoning falls short of the convincing line of reasoning required by MPEP § 706.02. Bit errors, if they exist in the multi-dimensional equalizer of Nobakht, may arise from a variety of sources. However, it would not be reasonable to preclude patentability of any features added to the multi-dimensional equalizer of Nobakht to correct bit errors or otherwise enhance performance. As such, Applicants submit that independent claim 1 is patentably distinguishable over Nobakht in view of Agazzi.

Claims 2-5 depend from independent claim 1. Insofar as independent claim 1 has been shown to be patentably distinguishable over the cited references, it follows that dependent claims 2-5 are likewise patentably distinguishable.

Independent claim 6 was rejected under 35 U.S.C. § 103 as being unpatentable over Nobakht in view of Agazzi and further in view of Choi.

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Independent claim 6 recites:

> 6. A method comprising:
> canceling far end cross talk and intersymbol interference in a
>   communication network, wherein canceling far end cross talk and
>   intersymbol interference comprises:
> estimating a change in error between an input signal vector and an output
>   signal vector;
> determining a multidimensional steepest descent gradient based on the
>   change in error;
> adjusting the output signal vector using the descent gradient. (Emphasis
> Added)

The office action admits that Nobakht fails to teach a multi-dimensional equalizer that

cancels far end cross talk. Presumably, the office action admits that Nobakht fails to

teach claim 6's act of "canceling far end cross talk." Presumably, the office action finds

this missing limitation in Agazzi and combines Nobakht and Agazzi using the same

rationale used to reject claim 1. Assuming these presumptions are true, applicant

reiterates their argument made with respect to claim 1 that the office action has failed to

present a prima facie case of obviousness for combining Nobakht and Agazzi.

Accordingly, claim 6 is submitted as patentably distinguishable.

The office action also admits that Nobakht fails to disclose use of a "descent

gradient operator" as required by independent claim 6. The office action alleges that

Choi teaches this missing limitation in column 4, lines 46-54. Thereafter, the office

action alleges that it would have been obvious to use the steepest descent method

disclosed by Choi with Nobakht's multi-dimensional equalizer in combination with

Agazzi. In support, the office action alleges that the motivation to use the steepest

descent method is that it is one of the fastest ways to compute error in a multi-

dimensional (variable) space, as is the case in a gigabyte Ethernet system, as stated by

Choi. Applicants request documentary support for the statement that using the steepest descent method is one of the fastest ways to compute error in a multi-dimensional (variable) space.

Presuming the office action is correct that using the steepest descent method is one of the fastest ways to compute error in a multi-dimensional (variable) space, this statement does not explain why one of ordinary skill in the art would add the feature of using a descent gradient in the multi-dimensional equalizer of Nobakht. Perhaps the office action impliedly argues that any feature added to Nobakht to correct error in a multi-dimensional (variable) space is obvious. Again, Applicants submit that this line of reasoning fails to rise to the convincing line of reasoning required by MPEP § 706.02(j) since the office action fails to show that Nobakht, Agazzi, or Choi do not expressly or impliedly suggest using a descent gradient in the multi-dimensional equalizer of Nobakht modified with a far end cross talk canceller as set forth in Agazzi. Accordingly, Applicants submit that claim 6 is patentable over the references cited.

Claims 7-11 depend from independent claim 6. Insofar as independent claim 6 is shown to be patentably distinguishable, it follows that claims 7-11 are likewise patentably distinguishable.

Claim 12 stands rejected under 35 U.S.C. §103 as being unpatentable over Nobakht in view of Agazzi. Independent claim 12 sets forth:

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> 12.   A method comprising:
>   canceling far end cross talk and intersymbol interference in a communication network, wherein canceling far end cross talk and intersymbol interference comprises;
>   compensating an output signal vector based on a plurality of tap matrices and an error vector signal, wherein the error vector signal is based on the difference between an input signal vector and the compensated output signal vector.

The office action asserts that Nobakht fails to teach a multi-dimensional equalizer that cancels far end crosstalk as required in claim 12. It appears that the office action asserts that claim 12's limitation canceling far end cross talk is obvious over the combination of Nobakht and Agazzi. It appears the office action combines Nobakht and Agazzi using the same reasoning that was used to reject claim 1. However, applicants have shown with respect to claim 1 that the office action has failed to present a prima facie case of obviousness for combining Nobakht and Agazzi. Accordingly, claim 12 is submitted as patentably distinguishable.   Further, the office action asserts that Agazzi meets the remaining limitation of independent claim 12. More particularly, the office action asserts that Agazzi teaches, "compensating and output signal vector based on a plurality of tap matrices and an error vector signal, wherein the error vector signal is based on the difference between an input signal vector and the compensated output signal vector" citing column 12, lines 24-38 of Agazzi in support thereof. Applicants have reviewed column 12, lines 24-38 of Agazzi and can find no teaching or fair suggestion of claim 12's limitation of compensating an output signal vector. Column 12, lines 24–38 sets forth:

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Thus, one Gb/s communication throughput of each of the transceiver blocks **102** and **104** is achieved by using four 250 Mb/s (125 Megabaud at 2 bits per symbol) constituent transceivers **108** for each of the transceiver blocks and four twisted pairs of copper cables to connect the two transceivers together.

FIG. **2** is a simplified block diagram of the functional architecture and internal construction of an exemplary transceiver block, indicating generally at **200**, such as transceiver **102** of FIG. **1**. Since the illustrated transceiver application relates to gigabit Ethernet transmission, the transceiver will be referred to as the "gigabit transceiver." For ease of illustration and description, FIG. **2** shows only one of the four 250 Mb/s constituent transceivers which are operating simultaneously (termed herein 4-D operation). However, since the operation of the four constituent transceivers are necessarily interrelated, certain blocks in the signal lines in the exemplary embodiment of FIG. **2** perform and carry 4-dimensional (4-D) functions and 4-D signals, respectively.

Column 12, lines 24-38 describe how transceiver blocks of Agazzi achieve one Gb/s communication using 250 Mb/s constituent transceivers. Column 12, lines 24-38 fail to teach or fairly suggest "compensating an output signal vector based on a plurality of tap matrices and an error vector signal, wherein the error vector signal is based on the difference between an input signal vector and the compensated output signal vector. For these reasons, Applicants submit that claim 12 is patentably distinguishable over the references.

Claims 13-18 depend from independent claim 12. Insofar as independent claim 12 has been shown to be patentably distinguishable, it follows that claims 13-18 are likewise patentable distinguishable.

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Independent claim 19 stands rejected under 35 U.S.C. § 103 as being unpatentable over Nobakht in view of Agazzi. It appears that the Examiner has applied the same rejection of claim 12 to reject independent claim 19. However, Applicants have shown that claim 12 is patentably distinguishable over Nobakht in view of Agazzi. Accordingly, Applicant submits that independent claim 19 is likewise patentably distinguishable over Nobakht and Agazzi.

Claims 20-25 depend from independent claim 19. Insofar as independent claim 19 has been shown to be patentably distinguishable over the references cited, it follows that claims 20-25 are likewise patentably distinguishable.
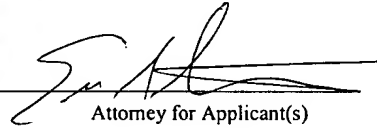
Independent claim 33 stands rejected under 35 U.S.C. § 103 as being unpatentable over Nobakht in view of Agazzi. It appears that the office action rejects independent claim 33 for the same reasons claim 12 was rejected. Insofar as it has been shown that independent claim 12 is patentably distinguishable over Nobakht in view of Agazzi, it follows that independent claim 33 is likewise patentably distinguishable.

Claims 34 – 39 depend from independent claim 33. Insofar as independent claim 33 has been shown to be patentably distinguishable, it follows that dependent claims 34-39 are likewise patentably distinguishable.

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CONCLUSION

In view of the amendments and remarks set forth herein, the application is believed to be in condition for allowance and a notice to that effect is solicited. Nonetheless, should any issues remain that might be subject to resolution through a telephonic interview, the Examiner is invited to telephone the undersigned at 512-439-5093.

Respectfully submitted,

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